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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/957,468	09/20/2001	Mehrdad Nikoonahad	5589-02305	2660

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EXAMINER

PHAM, HOA Q

ART UNIT	PAPER NUMBER
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2877

DATE MAILED: 07/31/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/957,468

Applicant(s)

NIKOONAHAD ET AL.

Examiner

Hoa Q. Pham

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 June 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1413-1500,1583,1688,1709 and 1751 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☐ Claim(s) 1413-1500,1583,1688,1709 and 1751 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 6,7. 6) ☐ Other: _____

DETAILED ACTION

1. With respect to the pre-amendment filed on 6/5/02, applicant cancelled claims 1-1412, 1501-1582, 1584-1687, 1689-1708, 1710-1750, and 1752-6632. Claims 1413-1500, 1583, 1688, 1709, 1751 are pending for examination.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1413-1420, 1424, 1433, 1436-1438, 1443, 1450-1451, 1478-1482, 1487-1488, 1500, 1583, and 1688 are rejected under 35 U.S.C. 102(b) as being anticipated by Maris et al (U.S Pat. 5,748,318).

Regarding claims 1413, 1450-1451, 1500, 1583, 1688, Maris et al discloses a sample stage (50, 122) for supporting a sample (51), a measurement device (1) coupled to the stage which comprises an illumination system (10, 10', 10'', 10''', 40, 44) for directing light toward to surface of the sample, and a detection system (58, 60, 52, 54) coupled to the illumination system for detecting light propagating from the surface of the sample, wherein the measurement device generates one or more signals in response to the detected light, and a processor (66) coupled to the measurement device to determine a first property, a second property, and a third property, wherein the first property comprises a critical dimension (thickness) of the sample, the second property

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comprises a presence of defects and the third property comprises a thin film characteristic (stress, thermal, elastic, etc..) of the sample (see figures 1a-1c, 2, 16-18, and abstract).

Regarding claims 1414-1416, figures 16-18 and column 23, lines 6-16 teach that the stage is moved in X, Y, Z directions and rotated (tilted) in θ -direction.

Regarding claim 1417, figures 1a, 1b, and 2 show that a single light source (12) is used.

Regarding claim 1418, figure 1c teaches the use of two light sources (12,13).

Regarding claim 1419, figure 6 teaches the use of a photo-detector (60) is used.

Regarding claims 1420 and 1437, figure 2 shows the use of detectors 58 and 60.

Regarding claim 1424, see column 27, line 53, for the principle of reflectometry.

Regarding claims 1433, 1436, see column 27, line 53 and column 25, line 35, for ellipsometer embodiment.

Regarding claim 1438, the optical elements, for example, elements 34, 34, 48, 52, and 54 are used for both first measurement device and second measurement device.

Regarding claim 1443, see abstract for the fourth property (roughness).

Regarding claims 1478, 1480, and 1481-1482, using processor to generate database is inherent in the system of Maris et al and also the system is used to detect a plurality of samples.

Regarding claims 1479, 1487, 1488, see column 20, lines 35-43, for calibration of the system.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1421-1423, 1425-1432, 1434-1435, 1439-1442, 1444-1449, 1452-1477, 1483-1486, 1489-1499, 1709 and 1751 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maris et al in view of Moore (5,872,632) and Kuriyama et al (4,865,445).

Regarding claims 1421-1423, 1425-1432, 1434-1435, 1439, 1440, Maris et al teaches the use of ellipsometer or reflectometer as mentioned above and does not explicitly teach the use of scatterometer, probe microscope, dark-field and/or bright-field device, etc., however, such devices are well known in the art. Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to include in or replace the optical inspection system of Maris et al by devices above if additional defects (i.e. micro defects and macro defects) and/or characteristics of the inspected object are detected. Such modification is recognized as being within the level of ordinary skill in the art.

Regarding claims 1441 and 1442, Maris et al, column 8, lines 38-42, teaches that the thin film to be inspected may be an overlying of oxide, polymer or metal. Thus, it would have been obvious to one having ordinary skill in the art at the time the invention

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was made to use the basic device of Maris et al to detect the defects of a copper film because the device would function in the same manner.

Regarding claims 1444-1449, 1452-1477, and 1489-1493, Maris et al teaches that the sample comprises a thin film (84) disposed on the substrate (semiconductor wafer)(80) or SOI wafer. Maris et al does not explicitly teach that inspection system is coupled to process tool or processing chamber. However, such a feature is known in the art as taught by Moore. Moore, from the same field of endeavor, teaches that the inspection station (210) is coupled to the processing chamber (105) or reaction chambers (110,120,130) which are used for etching, depositing, annealing, etc...) (see figure 2, column 1, lines 11-17). It would have been obvious to one having ordinary skill in the art at the time the invention was made to arrange the inspection system of Maris et al in a cluster tool as taught by Moore. The rationale for this modification would have arisen from the fact that including the inspection system in the cluster tool would save time required to move the substrate and take the substrate to a remote instrument as suggested by Moore (column 2, lines 1-7).

Regarding claims 1483-1486, 1495-1496, Kuriyama et al teaches the use of a plurality of measurement devices (100, 200) for measuring different properties of the object (see figure 3). Those of ordinary skill in the art at the time the invention was made to include in Maris et al a plurality of measurement devices as taught by Kuriyama if additional properties of the object are measured.

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Regarding claims 1497-1499, 1709 and 1751, Maris et al teaches the use of computer to control and process the signals and discusses the use of local processors (column 23, lines 15-16 and 26).

Double Patenting

6. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

7. Claims 1413-1500, 1583, 1688, 1709, and 1751 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 2132-2215, 2296, 2397, 2416, and 2454 of copending Application No. 09/956,837. Although the conflicting claims are not identical, they are not patentably distinct from each other because the difference between the present application and copending application is that the first property to be detected of the present application comprises a critical dimension while the first property of the copending application comprises a flatness measurement. It would have been obvious

to measure critical dimension instead of flatness measurement because it depend on what measurement one is looking for.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

8. Claims 1413-1500, 1583, 1688, 1709, and 1751 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1083-1160, 1234, 1339, and 1375 of copending Application No. 09/956,852. Although the conflicting claims are not identical, they are not patentably distinct from each other because all the limitations of present claimed invention are recited in the claims of copending application, for example, claim 1413 is corresponding to claims 1083 and 1109 of the copending application. The roughness of the specimen is considered as the presence of defects on the specimen.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

9. Claims 1413-1500, 1583, 1688, 1709, and 1751 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 742-820, 896, 989, 1005, and 1044 of copending Application No. 09/596,848. Although the conflicting claims are not identical, they are not patentably distinct from each other because all the limitations of present claimed invention are recited in the claims of copending application, for example, claim 1413 is

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corresponding to claims 742 and 770 of the copending application. The roughness of the layer on the specimen is considered as a thin film characteristic of the specimen.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

10. Claims 1413-1500, 1583, 1688, 1709, and 1751 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 5419-5475, 5533, 5648, 5706, and 5758 of copending Application No. 09/956,839. Although the conflicting claims are not identical, they are not patentably distinct from each other because the present claimed invention are broader than what was claimed in the copending application. All the limitations of the present application are recited in the claims of the copending application, for example, claim 1413 is corresponding to claim 5419 of the copending application.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Blayo et al (5,739,909) Michaelis et al (6,031,614) disclose an apparatus and method for measuring dimensions using ellipsometry.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hoa Q. Pham whose telephone number is (703) 308-4808. The examiner can normally be reached on 6:30 AM to 5 PM, Monday through Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Frank G. Font can be reached on (703) 308-4881. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.



Hoa Q. Pham
Primary Examiner
Art Unit 2877

HP
July 16, 2003